

NASA TECH BRIEF

Marshall Space Flight Center



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Artificial Atmosphere Control System

Aircraft, undersea research vessels, and medical respirators have a common problem. They all require that a specific, breathable atmosphere be maintained at a reasonable pressure. To meet this need a two-gas control system has been developed. This system is easily constructed since it uses existing hardware that has, however, been put together to provide a considerable degree of safety and efficiency.

When used to regulate an atmosphere of two gases such as oxygen and nitrogen the system:

- a. maintains a constant total atmospheric pressure,
- b. controls the O_2/N_2 ratio,
- c. gives caution and warning signals if the oxygen content falls too low,
- d. systematically checks its own critical functions during use, and
- e. is redundantly fail-safe.

The control system includes a principal gas flow regulator and a backup regulator, both equipped with manual valves should it be necessary to override the automatic control. An oxygen-partial pressure sensor monitors the oxygen level and directs pure oxygen flow until the oxygen reaches the upper limit of the desired concentration range. At this point nitrogen is added to the environment until the lower limit of the O_2 concentration is reached, at which time oxygen flow begins anew.

Three sensor/amplifier, controller systems are used for control, monitoring, and safety backup. Redundancy is also applied to the display gages which include three oxygen gages which serve as oxygen concentration indicators. To further lessen the chance of inadequate atmosphere, a caution and warning system automatically indicates low oxygen content.

The sensors are provided with an in-use functional check system, and the entire system is designed to operate fail-safe. Should something go wrong, such as a power failure or solenoid valve failure, pure oxygen will be supplied to maintain a safe pressure level.

Notes:

1. Further information concerning this innovation may be of interest to the aircraft industry and to designers and manufacturers of closed breathing systems including underwater breathing apparatus, respirators, and incubators.

2. Requests for further information may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Code A&PS-TU
Marshall Space Flight Center, Alabama 35812
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Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

Patent Counsel
Marshall Space Flight Center
Code A&PS-PAT
Marshall Space Flight Center, Alabama 35812

Source: D. R. Rebert, M. E. Peeples, and
J. D. Fuller of
McDonnell Douglas Corp.
under contract to
Marshall Space Flight Center
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